APPENDIX B

LIGHT/HEAVY OPERATIONS

Infantry units are often supported by heavy forces. An estimate of the tactical situation will determine the mixture and command relationship (attached versus OPCON). Tactics and techniques explained in this appendix are for infantry working with such armored vehicles as the M1 (series), M60A3, M551, M2, and M3. They also apply in the event the infantry rifle company is attached to a heavy battalion. The fundamentals and principles stated previously in this manual for offense, defense, and other tactical operations still apply. Additionally, infantry leaders must understand the tactical doctrine for employing a heavy company-team (FM 71-1), a tank platoon (FM 17-15), and a mechanized infantry platoon (FM 7-7, FM 7-7J).

B-1. VEHICLE CHARACTERISTICS

To effectively employ any unit, the leader must understand the specific capabilities and limitations of the unit and its equipment.

a. **Tanks**. The M1 series and M60A3 tanks provide rapid mobility combined with excellent protection and highly lethal, accurate fires. They are most effective in generally open terrain with extended fields of fire.

(1) *Mobility.*

(a) Capabilities. The tank's mobility comes from its capability to move at high speed both on and off road. The ability to cross ditches; ford streams and shallow rivers; and to push through small trees, vegetation, and limited obstructions allows effective movement in various types of terrain.

(b) Limitations. Tanks (especially the M1) consume large quantities of fuel. They are very noisy (especially the M60A3), and all tanks must be started periodically in cold weather or when using the thermal night sight and radios to ensure the batteries stay charged. The noise, smoke, and dust generated by tanks make it difficult for the infantry in their vicinity to capitalize on stealth to achieve surprise. Tanks cannot cross bodies of water deeper than 4 feet without deep water fording kits or bridging equipment.

(2) *Firepower.*

(a) Capabilities. The tank's main gun is extremely accurate and lethal at ranges out to 2,500 meters. Tanks with stabilized main guns can fire effectively even when moving at high speeds cross-country. The tank remains the best antitank weapon on the battlefield. The various machine guns (tank commander's caliber .50 and 7.62-mm coax and the loader's 7.62-mm MG on the M1) provide a high volume of supporting fires for the infantry. The target acquisition capabilities of the tank exceed the capability of all systems in the infantry battalion. The thermal sight provides a significant capability for observation and reconnaissance. It can also be used during the day to identify heat sources (personnel and vehicles) even through light vegetation. The laser range finder provides an increased capability for the infantry force to establish fire control measures (such as trigger lines and TRPs), and to determine exact locations.

(b) Limitations. The normal, basic load for the tanks main gun is primarily APDS antitank rounds. These rounds are not as effective against light armored or wheeled vehicles, bunkers, trenchlines, buildings, or enemy personnel. They also present a safety problem when fired over the heads of exposed infantrymen due to the discarded sabot pieces that fall to the ground. (See paragraph B-2) HE ammunition will provide better destructive effects on the above mentioned targets except enemy personnel, which the tank's machine guns are most effective against. The resupply of all tank ammunition is difficult and requires logistic support from the heavy battalion.

(3) *Protection.*

(a) Capabilities. Generally, the tank armor provides excellent protection to the crew. Across the frontal 60-degree arc, the tank is impervious to all weapons except heavy AT missiles or guns and the main gun on enemy tanks. When fighting with the hatches closed, the crew is impervious to all small arms fire, artillery rounds (except a direct hit), and AP mines. The tank's smoke grenade launcher and on-board smoke generator provide rapid concealment from all but thermal observation.

(b) Limitations. The tank is most vulnerable to lighter AT weapons from the flanks, top, and rear. The top is especially vulnerable to precision-guided munitions (artillery or air delivered). AT mines can also destroy/disable the vehicle. When fighting with hatches closed, the tank crew's ability to see, acquire, and engage targets (especially close-in infantry) is greatly reduced.

b. **Infantry Fighting Vehicle.** The M2/M3 provide good protection and mobility combined with excellent firepower. They operate best on the same terrain as the tank; however, their reduced protection when compared to the tank is a major employment consideration.

(1) *Mobility.*

(a) Capabilities. The mobility of the M2/M3 is comparable to the tank. Unlike the tank, the M2/M3 can swim large bodies of water in current up to 6.4 kilometers per hour. Entry and exit points must be available or prepared. In addition to the three-man crew, the vehicle is designed to carry six additional infantrymen.

(b) Limitations. The M2/M3 consume significant quantities of fuel. They are louder than the M1, and the engine must be started periodically in cold weather or when using the thermal night sight and radios to ensure the batteries stay charged. The noise, smoke, and dust generated by mechanized forces make it difficult for the infantry to capitalize on their ability to move with stealth and avoid detection when moving on the same approach.

(2) *Firepower.*

(a) Capabilities. The primary weapon on the M2/M3 is the 25-mm chain gun that fires APDS, HEI-T, and TPT. This weapon is extremely accurate and lethal against lightly armored vehicles, bunkers, trenchlines, and personnel at ranges out to 2,000 meters. The stabilized gun allows effective fires even when moving cross-country. The TOW provides an effective weapon for destroying enemy tanks or other point targets at extended ranges. The 7.62-mm coax provides a high volume of suppressive fires for self defense and supporting fires for the infantry. The combination of the stabilized turret, thermal sight, high volume of fire, and mix of weapons and ammunition (TOW, 25-mm, and 7.62-mm), makes the M2/M3 an excellent suppression asset supporting infantry assaults. The target acquisition capabilities of the M2/M3 exceed the capability of the other systems in the infantry battalion. The thermal sight provides a significant capability for observation and reconnaissance. It can also be used during the day to identify heat sources (personnel and vehicles) even through light vegetation.

(b) Limitations. When operating the thermal sight with the vehicle engine off, a "clicking" sound can be heard at a considerable distance from the vehicle. The resupply of ammunition is more difficult and will require external logistic support.

(3) *Protection.*

(a) Capabilities. Overall, the M2/M3 provides good protection. When fighting with the hatches closed, the crew is well protected from small-arms fire, fragmentation munitions, and AP mines. The M2/M3 smoke-grenade launcher and on-board, smoke generator provide rapid concealment from all but thermal observation.

(b) Limitations. The vehicle is vulnerable from all directions to any AT weapons and especially enemy tanks. AT mines will destroy/disable the vehicle. When the crew is operating the vehicle with the hatches open, they are vulnerable to small-arms fire.

c. **M551 Sheridan.** The M551 is a light reconnaissance vehicle that provides good firepower and mobility, but somewhat limited protection because of relatively thin armor.

(1) *Mobility.* Except for its dash speed, the Sheridan's mobility is roughly comparable to the M2/M3.

(2) *Firepower.* The primary weapon on the M551 is a 152-mm gun/launcher. It fires HEAT and HEP rounds and also a Shillelagh antitank missile. It also has a 7.62-mm coax MG and a caliber .50 MG for suppression. Although the M551 has an antitank capability, it is not designed to fight enemy main battle tanks. The fire control system is not stabilized.

(3) *Protection*. The M551's protection is about the same as the M2/M3.

d. **M113.** The M113 is a lightly armored personnel carrier that provides good mobility combined with fair firepower and protection.

(1) *Mobility.* The mobility of the M113 is significantly less than the M2/M3 in both speed and obstacle negotiating capability. A nine-man squad can ride inside and additional soldiers can ride on top if rope is lashed on to allow them to hold on. The M113 consumes significantly less fuel than the M2/M3. It is designed to swim deep bodies of water provided the current is minimal (1.5m/sec) and entry/exit points are available.

(2) *Firepower.* The M113's primary weapon system is the caliber .50 MG. It is not stabilized, requires the gunner to be exposed while firing, and is not accurate when fired on the move. From a stationary position, it can suppress area targets out to its maximum effective range of 1,800 meters. Most gunners can suppress point targets out to 700 meters. There is also a tripod and T&E mechanism available for dismounting the weapon and firing from a well-prepared fighting position. Although it is heavy, the weapon system can be broken down into manageable soldier loads and carried for short distances cross country.

(3) *Protection*. The M113 provides protection from small-arms fires (7.62-mm and smaller) and fragmentation munitions.

B-2. SAFETY CONSIDERATIONS

Infantry leaders at all levels need to be aware of safety when operating with armored vehicles. Leader awareness and involvement is particularly important if the infantry unit has had little training with armored vehicles. All personnel in the unit must be aware of these considerations and remain alert during light/heavy operations to prevent any unnecessary casualties.

a. Armored vehicle, especially tank, crews are unable to see infantry soldiers close to the vehicle. This is compounded when operating during limited visibility or when the hatches are closed. The crews' observation is focused on the enemy or potential enemy

locations and not on avoiding soldiers in their vicinity. It is the infantry soldier's responsibility to be alert and to maintain a safe position in relation to the vehicle.

b. Infantry soldiers close to armored vehicles are also exposed to the effects of any fire that the enemy may direct against the armored vehicles. This is true during movements and in stationary positions. The infantry's ability to avoid detection is severely degraded when in the vicinity of the armored vehicles. Even when required to provide security or close support to the vehicles, the infantry can usually maintain enough distance to avoid the effects of fires directed against the vehicles.

c. There are additional considerations when infantry is working near vehicles with reactive armor. Reactive armor is designed as an explosive charge inside a steel cassette. When struck by a chemical warhead, it explodes, disrupting the formation of the chemical jet to prevent it from penetrating the armor. During this explosion, the cassette plates become projectiles capable of killing unprotected infantry within 35 meters of the vehicle.

d. The high-velocity, armor-piercing, discarding sabot round fired by tanks and the 25-mm gun on the M2/M3 present a safety problem due to the discarded sabot that falls to the ground shortly after leaving the muzzle. The danger area extends out 400 meters along the gun-target line and along an arc of 10 degrees from the muzzle out to 400 meters on either side of the gun-target line. Infantry soldiers in this area require overhead cover and protection (a berm or tree) from the rear.

e. The exhaust from the M1 tank may be in excess of 1700 degrees. Soldiers following behind the tank must position themselves off to the side of the exhaust grill or at a safe distance if directly behind the tank.

f. Infantry should avoid riding on tanks unless this is required by the situation. If so, there are several safety concerns that must be addressed. For more information concerning riding on armored vehicles, see paragraph B-11. FM 7-8 discusses equipment required for rigging a vehicle and carrying soldiers on top.

B-3. EMPLOYMENT CONSIDERATIONS

The rifle company fights as part of a combined arms team, which often includes armored units. Armored vehicles provide unique capabilities to supported infantry units; these should be considered during the planning process. The CO must know how to employ and support these units. Generally, armored vehicles can contribute to the dismounted battle—

- By providing heavy suppressive fires and a mobile base of fire for dismounted infantry. The vehicles MGs can suppress enemy positions, kill personnel, and destroy lightly armored targets.
- By using their speed and shock effect to assist the infantry in rapidly executing an assault. Stabilized gun systems can provide accurate direct fires even while the vehicle is moving at high speeds.
- By providing effective antitank fires. Main armaments can destroy tanks, armored vehicles, and fortifications such as bunkers.
- By providing limited mobility to the dismounted force. Armored vehicles can rapidly move cross-country over trenches, trees, and small obstacles.
- By using their technical assets (thermal viewers, range finders, and so forth) to assist in target acquisition and ranging at long distances, day or night.

- By providing additional communication assets. The vehicle radios and the crew's use of arm-and-hand signals allow orders to be communicated rapidly between crews and dismounted troops.

B-4. SPECIAL CONSIDERATIONS

Armored vehicles have the following limitations and vulnerabilities that affect their employment in support of infantry forces.

- They are vulnerable to antitank guided missiles, guns, and mines; tanks; and aircraft.
- They require daily resupply of POL products in large quantities.
- They require extensive maintenance, skilled operators, and mechanics.

a. Existing or reinforcing obstacles can restrict or stop armored vehicle movement. Since armored vehicles often work with dismounted infantry in dense woods, urban areas, or other restricted terrain, infantry leaders must understand the mobility characteristics of the vehicles that are supporting the unit.

(1) When forced to fight buttoned-up (hatches closed), the crews' visibility is downgraded to only what they can see through their vision blocks.

(2) In close terrain, turret traverse may be restricted by trees, buildings, and so forth.

(3) In jungle or swampy areas, soft ground easily traversed by infantry may have to be bypassed by armored vehicles.

b. Depending on the situation, the ammunition basic load may also be a limitation. Bradley vehicles use a mix of 25-mm SABOT (kinetic energy) rounds and HE ammunition. The M1 and M60A3 tank's basic loads usually contain only SABOT and HEAT rounds. The M551 has both HEAT and HEP rounds available.

B-5. COMBINED OPERATIONS WITH ARMORED VEHICLES

Leaders must know what heavy and light forces can do for each other. They must know how to communicate by radio, phone, and visual signals.

a. Infantrymen help heavy forces by finding and breaching or marking antitank obstacles. They detect and destroy or suppress enemy antitank weapons. Infantrymen may designate targets for armored vehicles and protect them in close terrain.

b. Heavy forces help infantry by leading infantrymen in open terrain and providing them a protected, fast-moving assault weapons system. (This depends on the enemy's antitank capability.) They suppress and destroy enemy weapons, bunkers, and tanks by fire and maneuver. They may provide transport when the enemy situation permits.

B-6. MOVEMENT TO CONTACT

Infantry companies use one of two techniques to conduct a movement to contact: the approach-march technique and the search-and-attack technique (Chapter 4).

a. **Approach-March Technique.** The company team uses normal movement techniques (traveling, traveling overwatch, and bounding overwatch).

(1) Armored vehicles may follow and provide overwatch for the rifle platoons in traveling or traveling overwatch at a distance determined by the terrain and visibility. This allows the rifle platoons to move by stealth while being overwatched by the tanks.

(2) The armored vehicles may lead in traveling or traveling overwatch when speed is required and when in open terrain. When armored vehicles lead, they normally use

(platoon) bounding overwatch. Some infantrymen may ride with the overwatching armored vehicle section; these men provide security for the vehicle at halts, and they dismount to clear danger areas.

(3) In bounding overwatch, the armored vehicles are normally part of the overwatch element. In open terrain, the vehicles may be the bounding element.

b. **Search-and-Attack Technique**. The armored vehicles are normally employed under the battalion's scheme of maneuver. They may work with the company to concentrate combat power, isolate enemy positions, or attack enemy base camps. They may also escort convoys through terrain occupied by enemy forces.

B-7. ATTACKS

All attacks involving armored vehicles and infantry must be well - planned, thoroughly coordinated, and fully rehearsed. The communications procedures require special considerations to ensure mutual support and flexibility.

a. **Attacking on Converging Routes.** In this method, armored vehicles and infantry move on separate routes that meet on the objective. They each move on routes suitable for their movement. Armored vehicles may first support the infantry by fire, then close on the objective in time to assault it with the infantry (Figure B-1). This may require the infantry to breach obstacles/destroy certain antiarmor systems to help the armored vehicles reach the objective. Tanks are the only armored vehicles that should assault on to the objective unless the enemy has no antiarmor capability.

Figure B-1. Attacking on converging routes.

b. **Attacking on the Same Route.** When armored vehicles and infantry attack on the same route (Figure B-2), the two elements may move at the same speed or at different speeds.

(1) They use the same speed when there are no good overwatch positions or when there is a need for close, mutual support. For example, mutual support may be required when it is known that the enemy has antitank weapons and tanks, but their location is unknown. When attacking at the same speed, the infantry may be slightly ahead of (but not directly in front of), even with, or just to the rear of the armored vehicles.

(2) They move using different speeds when there are obstacles that the infantry must clear for the armored vehicles, or when the route offers good cover and concealment for the infantry but not for the armored vehicles. In these cases, the armored vehicles (first) support by fire while the infantry moves to its assault position. The armored vehicles then move forward to assault with the infantry. The armored vehicles may, however, lead the infantry against an enemy that is being suppressed, that does not have well-prepared positions with overhead cover, or that does not present a great antiarmor threat.

c. **Armored Vehicles Supporting by Fire Only**. This method is used when obstacles keep the armored vehicles from closing on the objective. The armored vehicles occupy positions where they can support the attacking infantry (Figure B-3). As soon as the obstacles are breached or a suitable bypass is found, the armored vehicles rejoin the infantry.

d. **Consolidation and Reorganization**. When a company team has seized an objective, the team consolidates. The CO either directs the armored vehicle leader to

position his vehicles in overwatch positions behind the infantry so they are ready to move forward when needed, or he directs them to hull-down positions with the infantry to block armor counterattack approaches. If the withdrawing enemy can be seen and is still in range, the armored vehicles continue to fire. Throughout the attack, the team reorganizes and replaces any lost leaders.

Figure B-2. Attacking on the same route.

Figure B-3. Armored vehicles support by fire.

B-8. DEFENSE

Armored vehicles add strength, depth, and mobility to the defense. The CO may initially position them forward to engage the enemy at long ranges and then move them back to cover armor approaches. However, the CO must move the vehicles where needed to concentrate fire against an enemy attack. He should also use them to add strength to the counterattack force.

a. The commander may temporarily position his armored vehicles (with infantry for security) forward of the company's defensive positions. When so deployed, they can force the enemy to deploy early. This forward deployment of armored vehicles may deceive the enemy as to the location of the company's defensive positions. As soon as the enemy is close enough to threaten them, the armored vehicles must withdraw to their defensive positions. Smoke is used to screen their withdrawal. Since the tank platoon has no FO, the CO may attach an FO to them (deployed forward) to assist in calling for and adjusting indirect fire and CAS.

b. There are two basic ways for the defending rifle company CO to employ armored vehicles. In both, the CO selects their general positions and sectors of fire. The armored vehicle leader advises the CO and selects the exact positions and controls fire and movement.

(1) The first way is to integrate the vehicles throughout the company defense, both laterally and in depth, to cover armor avenues of approach (Figure B-4). This may be done when there are only a few good firing positions or when the terrain restricts fast vehicle movement. Each vehicle should have mutual support with at least one other vehicle. The armored vehicles remain under the control of the armored vehicle platoon leader. (Appendix J discusses the employment of antiarmor weapon systems.)

(2) The second way to employ armored vehicles is to hold them in reserve in a position behind the forward infantry platoons (Figure B-5). This may be done when there

are several armor AAs into the company sector. There must, however, be sufficient vehicle firing positions and routes to them. When targets appear, the armored vehicles move to forward or flank firing positions. This allows quick concentration of the vehicles at a critical point to repel an attack. The CO should determine his decision points/criteria for initiating the armored unit's move. The leader of this unit should know when to move in case communication is not possible.

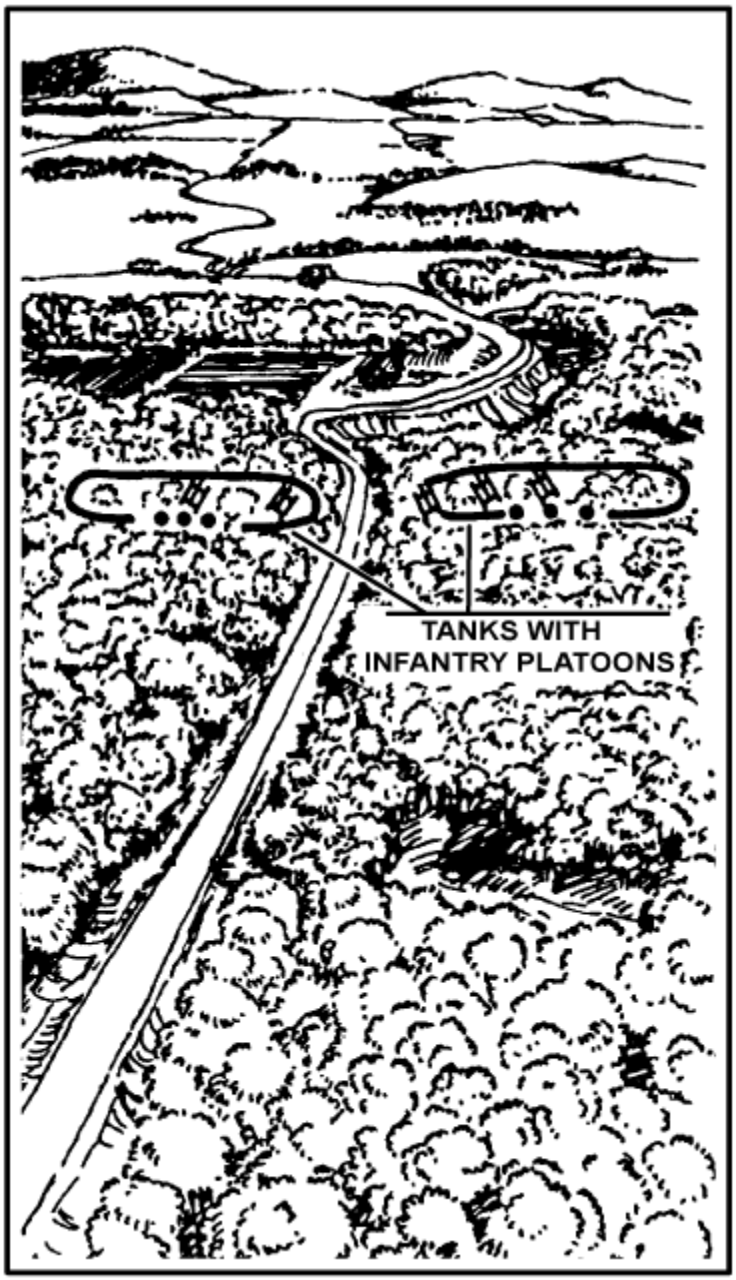

Figure B-4. Armored vehicles integrated throughout the position.

c. With either employment method, the armored vehicle platoon leader selects covered (hull-down) primary, alternate, and supplementary firing positions for each vehicle. If covered firing positions are not available, he may assign them hide positions.

B-9. RETROGRADE OPERATIONS

In retrograde operations, armored vehicles may be used to support the infantry when the terrain or the enemy force makes it mainly an infantry fight. In other situations, the infantry may protect the armor or the two may be employed separately on different AAs. When fighting together on the same AA, the infantry may first disengage to a nearby covered position. The armored vehicles can then disengage and move to overwatch positions where they continue to cover the infantry's withdrawal. If the retrograde operation is conducted when visibility is poor, some infantrymen may stay with the armored vehicles to provide security.

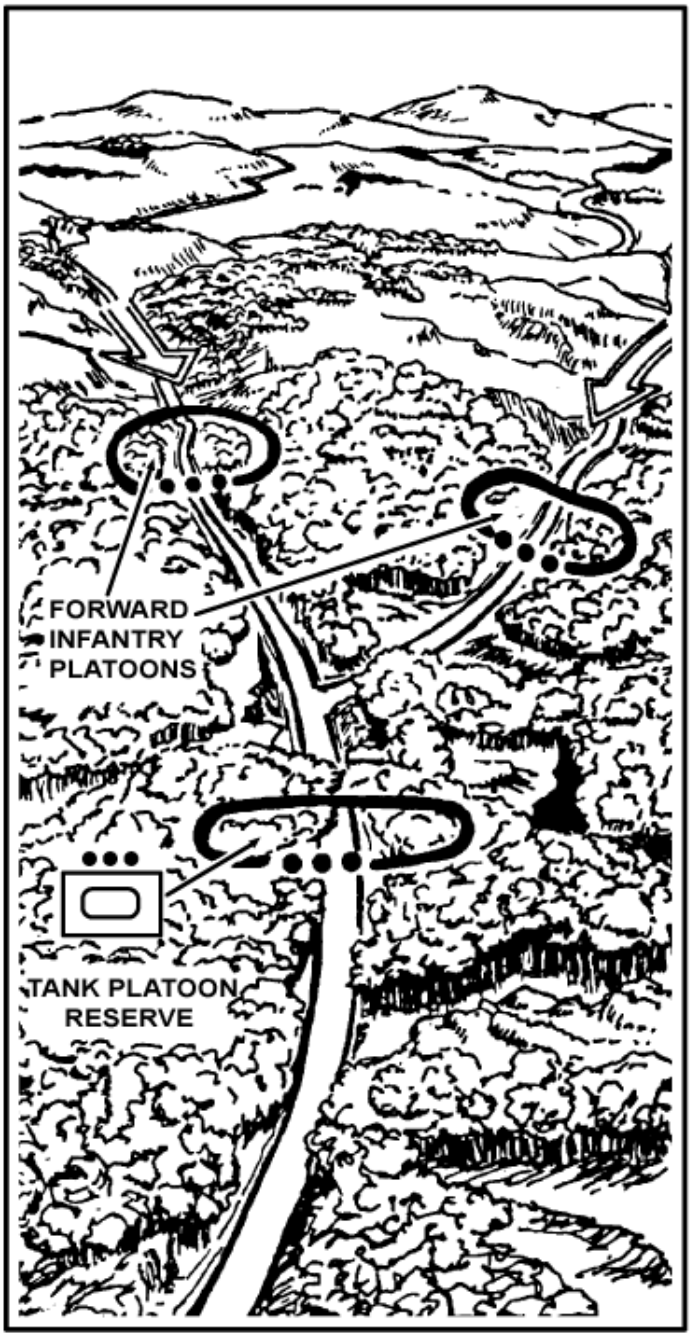

Figure B-5. Armored vehicles held in reserve.

B-10. LOGISTICAL SUPPORT

An armored vehicle platoon, under OPCON of the rifle company, receives fuel, maintenance and recovery support, and ammunition from its parent company. The platoon normally comes to the rifle company with its own fuel tanker and ammunition vehicle. If the parent company cannot provide recovery assets to the armored vehicle platoon, the platoon can perform self-recovery. The platoon leader can communicate with his CO for support; however, he must coordinate with the infantry company CO for a place and time to conduct his logistical activities.

B-11. INFANTRY RIDING ON ARMORED VEHICLES

There may be times when armored vehicles and infantry must move quickly from one place to another to accomplish their mission. In such cases and providing that there is little likelihood of making enemy contact along the way, soldiers may ride on the decks of the armored vehicles.

a. Riding on the outside of the vehicles is hazardous. Infantry should only ride on vehicles when the risk of enemy contact is minimal and or the need for speed is great. By riding on the vehicle, the infantry has given up its best protection—its ability to move with stealth and avoid detection. Soldiers riding on armored vehicles are vulnerable to all types of fire. Also, soldiers must watch for obstacles, which may cause the tanks to turn suddenly; for tree limbs, which may knock them off; and for the traversing of the turret gun, which may also knock them off.

b. The only advantage the infantry gains is speed of movement and increased haul capability. In this case, the following apply:

(1) Avoid riding on the lead vehicle of a section or platoon. These vehicles are most likely to make contact, and they can react quicker without soldiers on top.

(2) Position the infantry leaders with the armored vehicle leaders. Discuss and prepare contingency plans for chance contact or danger areas. Infantry should dismount and clear choke points or other danger areas.

(3) Assign air guards and sectors of responsibility for observation. Ensure all personnel remain alert and stay prepared to dismount immediately. In the event of contact, the armored vehicle will immediately react as required for its own protection. The infantry on top are responsible for their own safety. Rehearse a rapid dismount of the vehicle.

(4) Consider putting rucksacks, ammunition, and other equipment on the vehicles and having the infantry move on a separate AA. This will increase the mobility of the infantry, and they can move through more suitable terrain.

c. Riding on tanks reduces tank maneuverability and may restrict firepower. Infantrymen may be injured if the tank must slew its turret to return fire on a target. Consequently, soldiers must dismount to clear danger areas (FM 7-8) or as soon as enemy contact is made.

B-12. COMMUNICATING WITH TANKS

Before an operation, infantry and tank unit leaders must coordinate communications means. This should include the use of radios; phones; and visual signals such as arm-and-hand signals, panels, lights, flags, and pyrotechnics. Most tanks (except the M1) have an external phone on the rear for infantrymen to use; the user can talk to the tank crew over the tank intercom system. When an infantryman wants to talk to the tank crew, he picks up the phone, presses the push-to-talk button, and talks to the crew. When the tank commander wants to talk to nearby infantrymen, he activates an orange flashing light on the outside phone. On the M1, the infantryman can run communication wire to the TC through the turret. This wire can be hooked in to the tanks communication system to provide a means of communication for nearby soldiers.